Priority Research Direction: Exascale Work Environments

Key emerging challenges

- Computational science requires attention to computational concerns, leaving less time for science
- Compute, storage, simulations and analyses are increasing in complexity; the trend above worsens
- Provenance is often lost due to disparate execution and storage strategies
- Collaboration around decentralized and distributed resources and data is difficult at best

Summary of research direction

- Design an environment to simplify development, simulation, and analysis on increasingly complex compute and storage resources
- Develop methods for analysis of exascale datasets: mining, statistical analysis, visualization, metadata
- Automate provenance tracking
- Seamlessly accessible from anywhere (laboratory, home, mobile)

Potential impact on software/systems

- Facilitates execution on diverse compute resources
- Centralized repository of scientific data will improve individual and team access
- Data movement can be optimized independent of users
- Migration to future compute and storage resources will be simplified

Potential impact on science communities or DOE capabilities

- Scientists will devote more of their time to science codes, less to computational concerns
- Basic analysis will be included; domain-specific analysis can be integrated
- Provenance tracking will improve understanding of results and research trajectories
- Will accelerate time to discovery and support publishing of results